

**Notice of Allowability**

Application No.

10/781,168

Examiner

A. Dexter Tugbang

Applicant(s)

YANG ET AL.

Art Unit

3729

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to application filed on February 18, 2004.
2. ☒ The allowed claim(s) is/are 12-22.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All   b) ☐ Some\*   c) ☐ None   of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 5/6/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),  
Paper No./Mail Date attached herein.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_.

A. Dexter Tugbang  
Primary Examiner  
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## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of the invention of Group III, Claims 12-22, in the reply filed on April 21, 2006 is acknowledged. The traversal is on the ground(s) that the searches for the inventions of Groups I through IV would be coextensive and would cover the same field, or at least the same class/subclasses. This is not found persuasive because while each Group may have some features that are common (e.g. the product of a magnetic head), it is the features that make each Group distinct as noted in the previous Office Action as to why the inventions are separate from each other. Each Group (e.g. I) requires a distinct line of patentability that is not present in the other groups (e.g. II through IV) and to examine all of the groups would include various factors, such as the application of different art, different case law, and different fields of searches that would be *non-coextensive*. For example, the field of search for Group II would not be the same field of search for Groups I, III and IV. Some of the class/subclasses in the field of search may overlap between the different groups, but this would require completely separate features to be searched even within the same class/subclass and a major duplication of effort on the examiner's part. So all of these factors considered would place a serious burden on the examiner to search and examine all of the inventions of Groups I through IV.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 1-11 and 23-28 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or

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linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on April 21, 2006.

### **EXAMINER'S AMENDMENT**

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Stephen B. Ackerman on June 22, 2006.

The application has been amended as follows.

#### In the Specification

On page 1 (at line 1), the title in its entirety has been replaced with the following:

--A PROCESS OF MANUFACTURING A PERPENDICULAR MAGNETIC POLE  
STRUCTURE--.

On page 10, the paragraph of "Moving now to...FIG. 9." (at lines 13-19) has been replaced with the following (changes shown underlined):

--Moving now to FIG. 8, all material not covered by the hard mask is then removed down as far as substrate 11, thus forming cavity 81 which is overfilled with insulation layer 91 (a material such as Al<sub>2</sub>O<sub>3</sub> or SiO<sub>2</sub>). This is followed by the first of two CMP steps discussed earlier

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in which CMP proceeds until the end point detection layer which acts as an etch stop layer 61 is just exposed, the exact point at which to terminate CMP being determined through optical inspection of layer 61. The precise exposure of layer 61 also leads to the simultaneous exposure of layer 14 so there is no danger of over-polishing the stitched write shield, as illustrated in FIG.

9. The first CMP step further comprises: using a slurry of 2-5 weight % alumina, with 93-96 weight % deionized water, at a pH of about 7.5 to 8.5; applying a back pressure between -6 and 6 p.s.i.; having a wafer rotation speed between about 50 and 70 r.p.m.; exerting a wafer polish pressure between about 4 and 6 p.s.i.; and including less than about 2% additives by weight.--

On pages 10 and 11, the paragraph "The structure...on layer 91 and 14" (beginning at line 21 of page 10 bridging to line 3 of page 11) has been replaced with the following (changes shown underlined):

--The structure is now ready for the final trimming of stitched write shield 14 which is accomplished using the second of the two afore-mentioned CMP steps until the desired final thickness is reached. As shown in FIG. 10, the process concludes with the deposition of first and second write shields, 12 and 13 respectively, on layer 91 and 14. The second CMP step further comprises: using a slurry of 2-7.8 weight % alumina, with 90-95 weight % deionized water, at a pH of about 4 to 4.8; applying a back pressure between -6 and 6 p.s.i.; having a wafer rotation speed between about 50 and 70 r.p.m.; exerting a wafer polish pressure between about 4 and 6 p.s.i.; and including less than about 3% additives by weight.--

In the Claims

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Claims 1-11 and 23-28 have been canceled.

Claim 12 has been amended as follows.

12. (Amended) A process to form a magnetic write head, including a stitched write shield and a main pole comprising:

forming a first magnetic disk on a substrate and abutting said first magnetic disk with a first layer of insulation with which [it shares] the first magnetic disk and the first layer of insulation each share a first common top surface;

depositing a non-magnetic write gap layer on said first common top surface;

forming on said write gap layer a second magnetic disk and abutting said second magnetic disk with an end point detection layer with which [it shares] the second magnetic disk and the end point detection layer each share a second common top surface;

forming on said second common top surface a hard mask that defines, within said magnetic disks, the stitched write shield and main pole;

then removing all material not covered by the hard mask down as far as said substrate, thereby forming a cavity;

overfilling said cavity with a second layer of insulation and then performing a first CMP step until said end point detection layer [of etch stop material] is just exposed, thereby also just exposing said second magnetic layer and thus forming therefrom said stitched write shield; and

then performing a second CMP step until said stitched write shield has been given a desired thickness.

In Claim 17, “a hard” (line 1) has been changed to –the hard--.

*Reasons for Allowance*

4. The following is an examiner’s statement of reasons for allowance.

The prior art does not teach all of the limitations of the claimed invention including: forming a first magnetic disk on a substrate and abutting the first magnetic disk with a first layer of insulation with which the first magnetic disk and the first layer of insulation each share a first common top surface; depositing a non-magnetic write gap layer on the first common top surface; forming on the write gap layer a second magnetic disk and abutting the second magnetic disk with an end point detection layer with which the second magnetic disk and the end point detection layer each share a second common top surface; forming on the second common top surface a hard mask that defines, within the magnetic disks, the stitched write shield and main pole; then subsequently removing all material not covered by the hard mask down as far as said substrate, thereby forming a cavity.

The references to Wei et al (U. S. Patent 6,416,677) and Hanafi et al (U. S. Patent 6,063,699) disclose that it is known to form a hard mask and remove all material not covered by the mask down to a substrate thereby forming a cavity.

Wei shows a magnetic head including forming a hard mask (e.g. 64 in Fig. 7) and removing all material (e.g. material in layers 623, 66) not covered by the hard mask to form a cavity, and then subsequently overfilling the cavity with a material (e.g. 423).

Hanafi shows forming a hard mask (e.g. 44 in Fig. 3b), removing all material (e.g. material in layers 40, 14) not covered by the hard mask as far down as the substrate (e.g. 10) to form a cavity, then subsequently overfilling the cavity with layer of insulation (e.g. 48).

However, Wei et al and Hanafi et al either alone, or in combination, do not teach forming a first magnetic disk on a substrate and abutting the first magnetic disk with a first layer of insulation with which the first magnetic disk and the first layer of insulation each share a first common top surface, depositing a non-magnetic write gap layer on the first common top surface, forming on the write gap layer a second magnetic disk and abutting the second magnetic disk with an end point detection layer with which the second magnetic disk and the end point detection layer each share a second common top surface, forming on the second common top surface a hard mask that defines, within the magnetic disks, the stitched write shield and main pole, and then subsequently removing all material not covered by the hard mask down as far as said substrate, thereby forming a cavity.

Accordingly, Claims 12-22 are allowed.

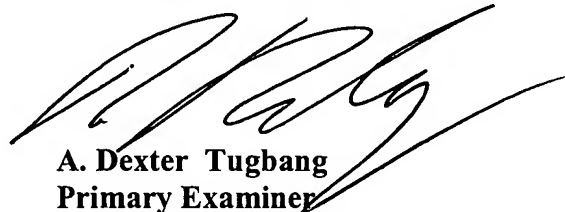
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570. The examiner can normally be reached on Monday - Friday 8:30 am - 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



**A. Dexter Tugbang**  
**Primary Examiner**  
**Art Unit 3729**

June 22, 2006